

Formation of estuarine subaqueous dunes in coarse silt and very fine sand in resuspension-dominated tidal flow conditions

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ABSTRACT: We investigated the influence of resuspension on dune formation in coarse silt and very fine sand in the Yangtze estuary focusing on explaining why dunes occur in tidal estuaries with fine sediment ($0.063 < D_{50} < 0.125$ mm) in contrast to what the models suggest. We simultaneously measured dune length and height and flow and suspended sediment concentration (SSC) and analyzed the data to assess the importance of resuspension with periodicity ranging from a few seconds to a few minutes. Equations for the influence of SSC on dune shape in fine sediment were derived using a more complex approach with the same scale level of time-variable SSC as the reference SSC. Results show that subaqueous dune formation is highly correlated with longer periodical resuspension (2–4 min) instead of shorter, periodic, burst-like boils over dune crests (<1 min). Here, we suggest a new analytical model to relate resuspension events to flattened dunes in estuaries.